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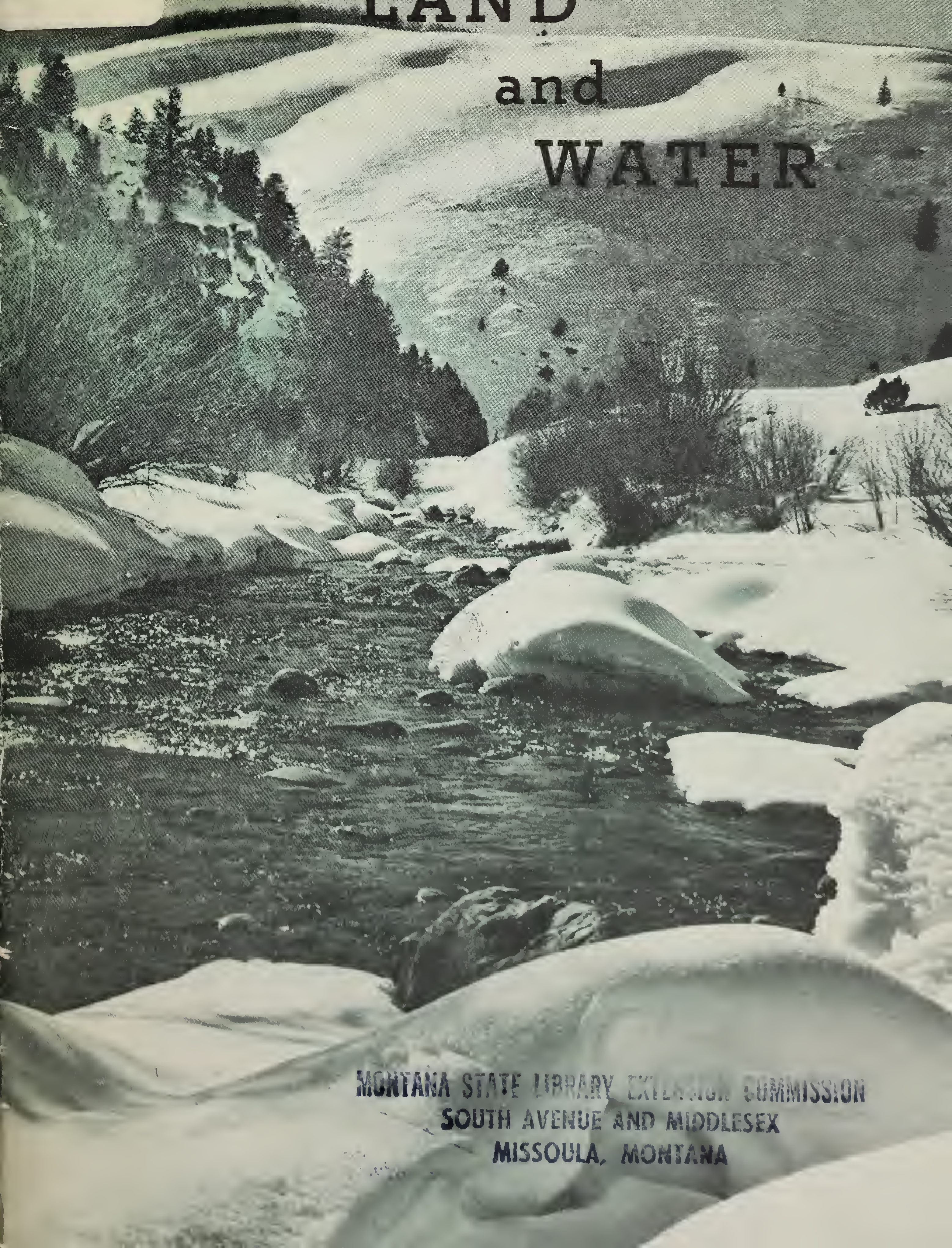
STATE DOCUMENTS

etter Use of Montana's
LAND
and
WATER



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PROGRESS REPORT

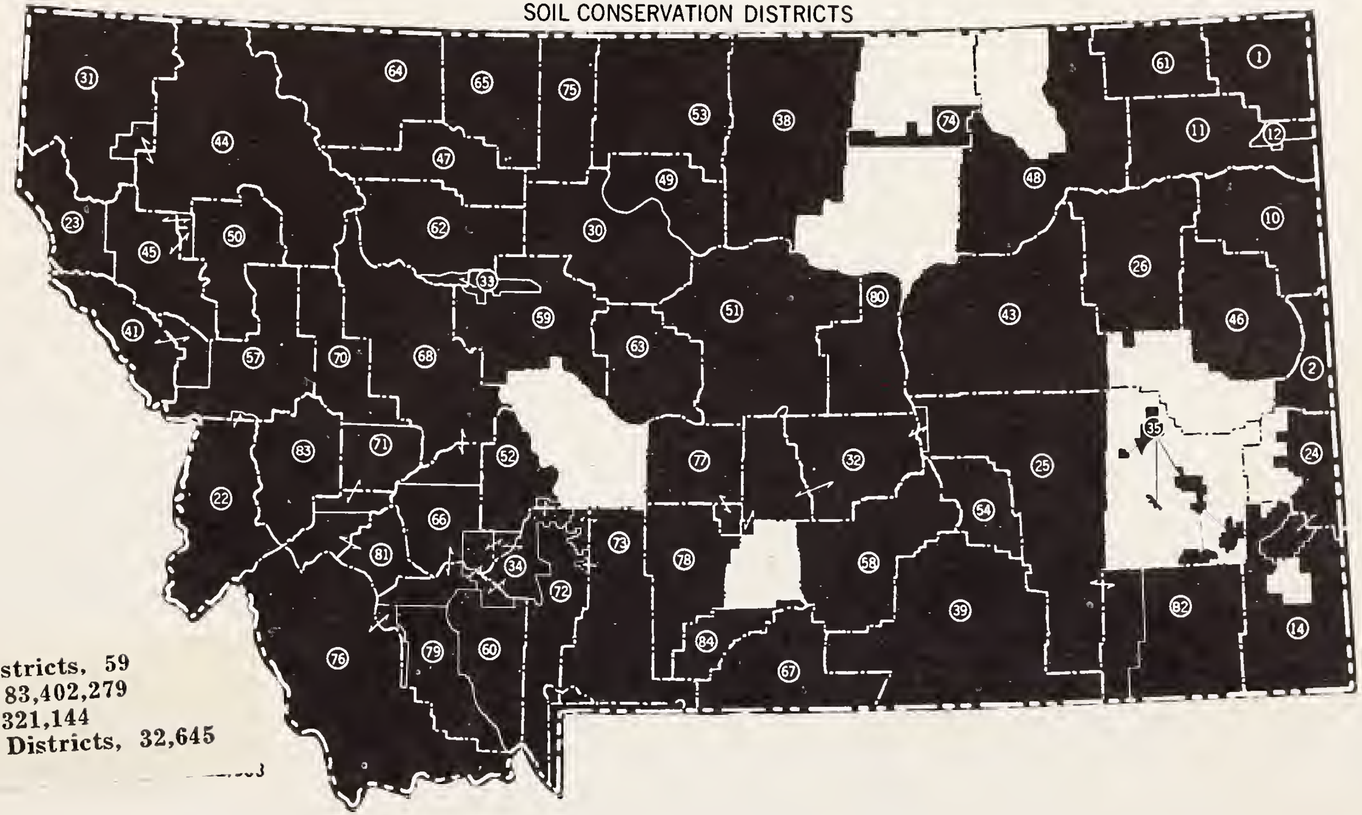
MONTANA STATE SOIL CONSERVATION COMMITTEE

1940-1956

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

MONTANA
SOIL CONSERVATION DISTRICTS



Total number of Districts, 59
Acres in Districts, 83,402,279
Acres in farms, 51,321,144
Operating units in Districts, 32,645

1. RESERVE
2. WIBAUX
10. RICHLAND CO.
11. CULBERTSON-BAINVILLE
12. FROID
14. BOX ELDER
22. BITTERROOT
23. GREEN MOUNTAIN
24. LITTLE BEAVER
25. ROSEBUD CO.
26. MC CONE
30. CHOUTEAU CO.
31. LINCOLN
32. LOWER MUSSELSHELL
33. SUN RIVER
34. THREE RIVERS
35. NORTH CUSTER
38. PARADISE
39. BIG HORN
41. MINERAL CO.
43. GARFIELD CO.
44. FLATHEAD
45. EASTERN SANDERS CO.
46. DAWSON CO.
47. PONDERA CO.
48. VALLEY CO.
49. BIG SANDY
50. LAKE CO.
51. FERGUS CO.
52. BROADWATER CO.
53. HILL CO.
54. TREASURE CO.
57. MISSOULA CO.
58. YELLOWSTONE
59. CASCADE CO.
60. MADISON
61. DANIELS CO.
62. TETON CO.
63. JUDITH BASIN CO.
64. GLACIER CO.
65. TOOLE CO.
66. JEFFERSON VALLEY
67. CARBON CO.
68. LEWIS & CLARK CO.
70. NORTH POWELL
71. DEER LODGE VALLEY
72. GALLATIN VALLEY
73. SHIELDS VALLEY
74. MALTA-MILK RIVER
75. LIBERTY CO.
76. BEAVERHEAD
77. UPPER MUSSELSHELL
78. SWEET GRASS
79. RUBY VALLEY
80. PETROLIA
81. MILE HIGH
82. POWDER RIVER
83. GRANITE
84. STILLWATER

COVER PICTURE—This scene is on the Boulder River south of Big Timber. It was selected because of the graphic manner in which it depicts Natures' method of storing moisture in the form of snow on the high watersheds of Montana for beneficial use later. Protection of the vegetative cover in these high watersheds is essential in preventing rapid snow melt, erosion, and flood damage.

STATE SOIL CONSERVATION COMMITTEE

MEMBERS OF THE STATE SOIL CONSERVATION COMMITTEE

Top Row, left to right: John M. Schroeder, Lolo; John G. Buttelman, Chairman, Willow Creek; M. M. Kelso, Bozeman.

Bottom Row, left to right: Fred Sanborn, Great Falls; N. E. Beers, Bozeman; A. H. Kruse, Helena.

Fay Crusch of Bainville is also a member of the State Committee but was not present when the pictures were taken.

FOREWORD

Soil Conservation Districts were authorized by a law passed by the State Legislature in 1939 known as the Soil Conservation Act which provides for voluntary action, home rule, and the protection of the rights of indivoduals.

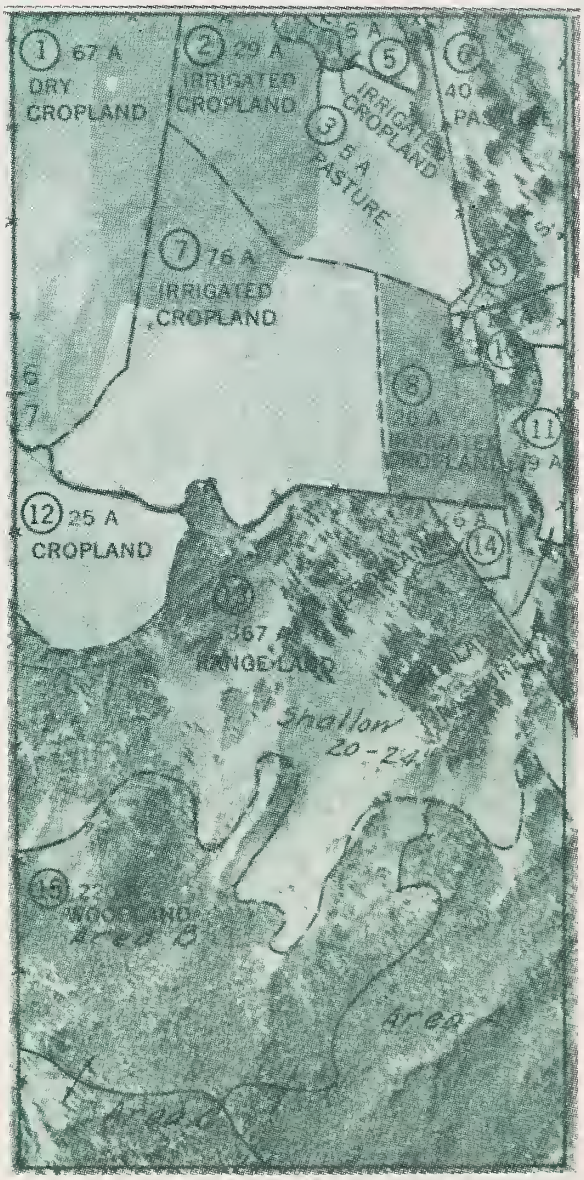
Fifty-nine Districts have been organized in Montana under this act, and have formed the Montana Association of Soil Conservation Districts in order to obtain the benefits of group action. The objective is to plan, promote, and consummate a comprehensive system of soil and water conservation for the State of Montana through Soil Conservation Districts.

The Soil Conservation Act also provided for a State Soil Conservation Committee. Its duties are to supervise the organization of districts, assist them in any way possible, and to disseminate information regarding operation of the soil conservation program.

This progress report is being issued in response to that obligation, and is dedicated to the farmers and ranchers of the State, who, through their cooperation with their local Soil Conservation Districts, have made the listed accomplishments possible.

CONSERVATION PLANNING

Development by every farmer and rancher of a conservation plan of operations for his soil and water resources in accordance with sound principles is the ultimate goal of every Soil Conservation District. These plans are written agreements between the district and the farmer or rancher. All available technical assistance is utilized in making necessary soil surveys, engineering investigations, and vegetative studies upon which to base of conservation plan. The final plan is developed in consultation with the farmer or rancher. There now are 8,111 basic conservation plans in effect in Montana districts, while 24,391 remain to be developed.



This conservation plan map on an aerial photograph shows field numbers, sizes, boundaries and fences. Proper land use is indicated. A plan of conservation operations showing practices needed on each field accompanies the map.

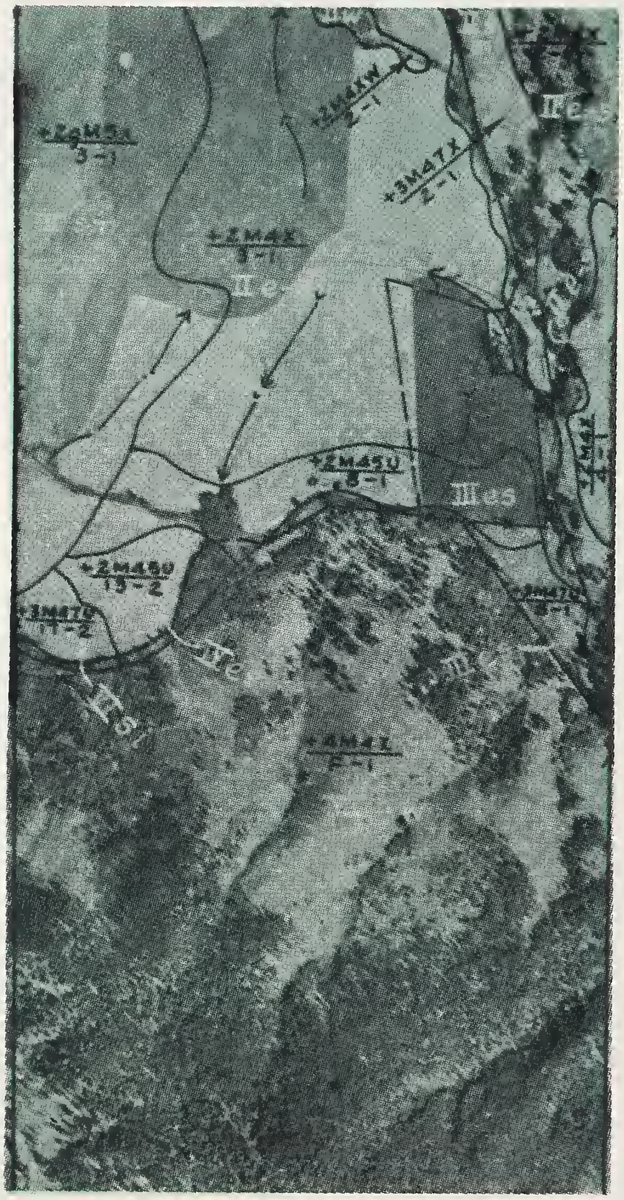
A Powder River District rancher (left) points out a conservation problem on the aerial map of his ranch. The SCS work unit conservationist (right) and the rancher will work out the conservation plan to meet all problems. The plan then will be reviewed by the district board of supervisors. The rancher, with any needed technical or equipment assistance available from the district, will carry out the proper land use and practices necessary to protect and improve the soil and water resources.

A group of Lewis and Clark District ranchers and the SCS ranch conservation planner study the condition on a range site. The group will determine the condition of the grass and grazing problems. Then each rancher, with the SCS technician, will develop grazing management plans to best prevent erosion and produce the most forage on his own operating unit. Plans then will be reviewed by the district governing body and put into final form.

Soil surveys provide an inventory of the various kinds of land. Each needs different treatments to control erosion and produce the maximum now and in the future. Kinds of land are called capability classes. These are divided into capability units.

Soil surveys are made to determine capability units. These surveys reflect such things as erosion, slope, depth of topsoil and sub-soil, texture or size of soil particles, structure or arrangement of soil particles, parent material or kind of rocks from which the soil was developed, soil color, climate under which the soil was formed and organic matter.

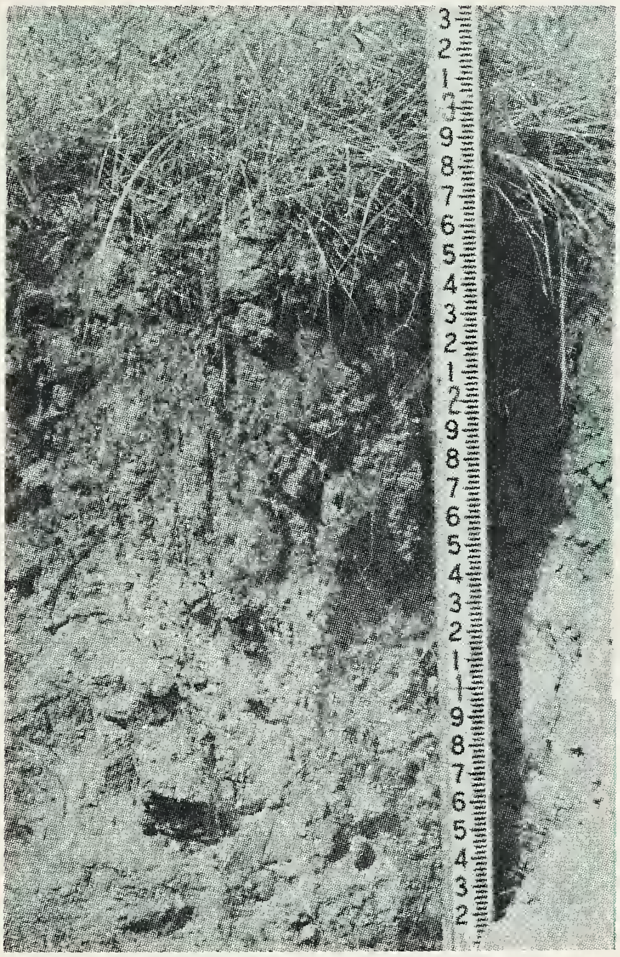
Soil surveys have been made on more than 12½ million acres in Montana districts. Another 40¾ million acres need to be surveyed before conservation planning can be done effectively.



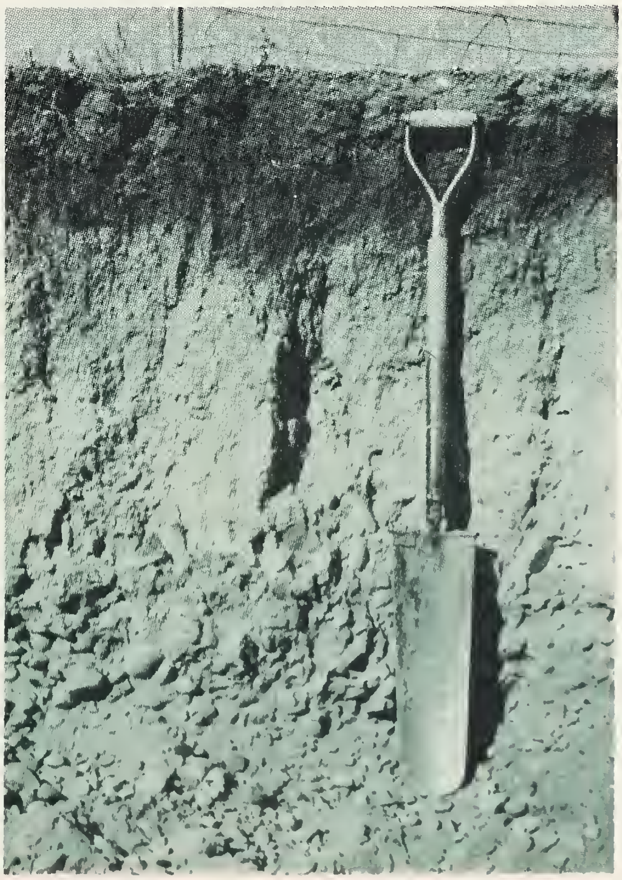
A soil survey map shows characteristics by fraction symbols. (Example $\frac{\text{+ 2M4X}}{\text{3-1}}$).

Land capability units are shown in white symbols. (Example II e-s). The map is included in the conservation plan.

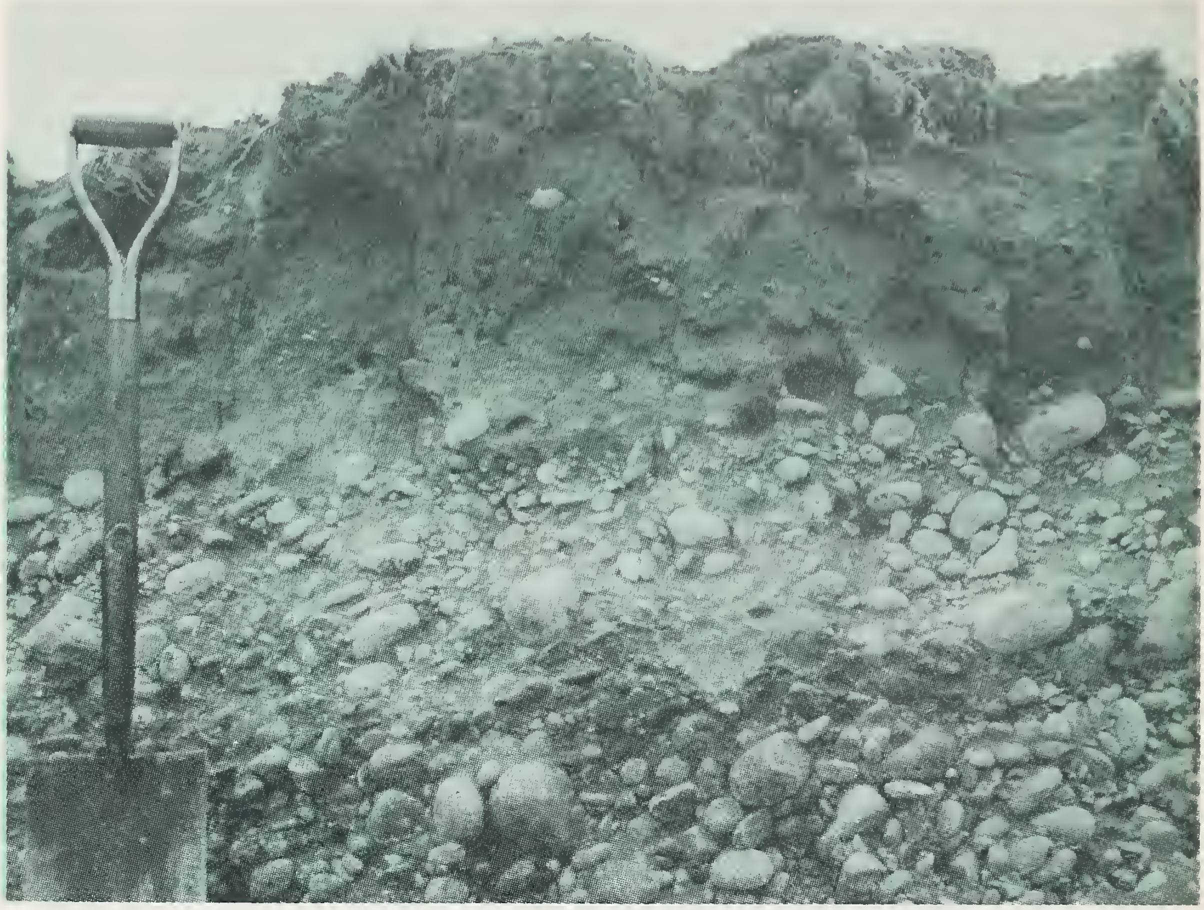
Examples of some of the different classes of soil are shown in the following pictures.



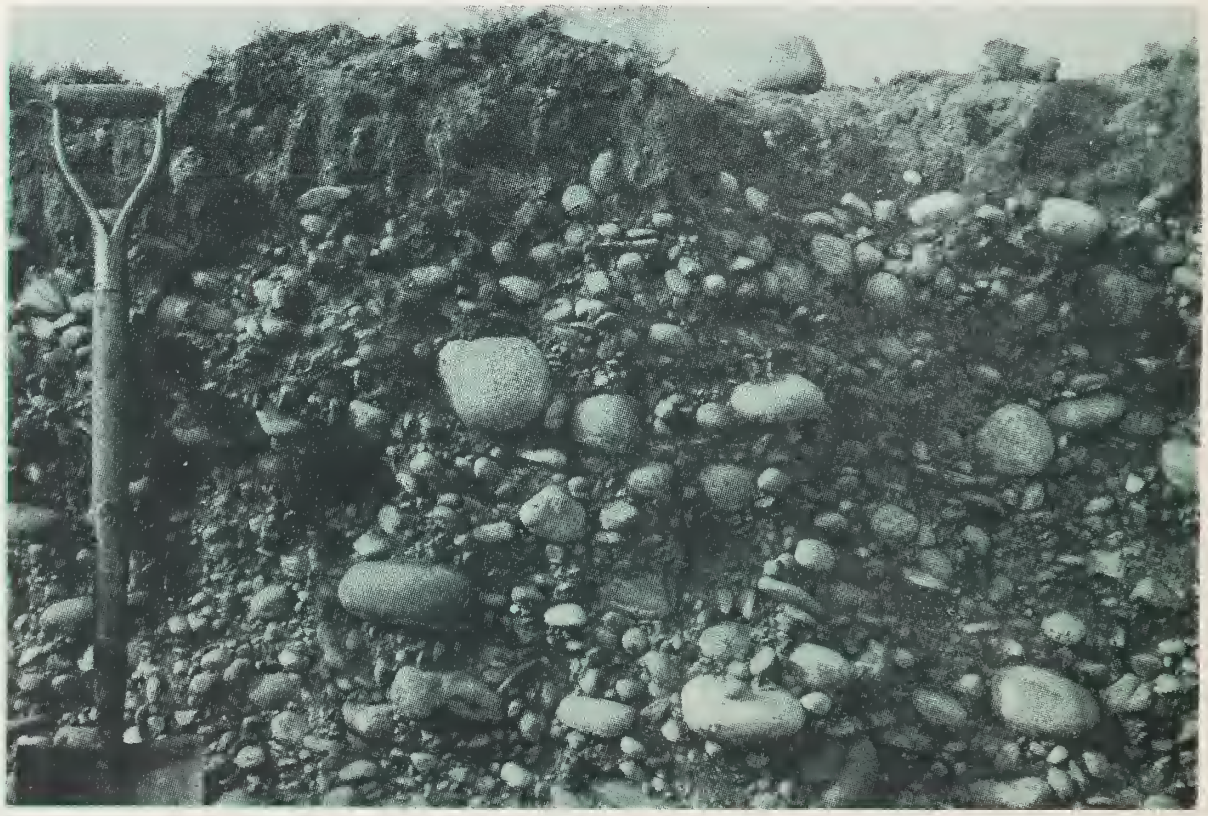
Class I Irrigated or Class II Dryland. Soil is at least three feet deep. It has medium-size particles. It will take water readily and hold a large amount for plant use. The topsoil is dark in color to a depth of 12 to 16 inches, indicating high organic content. This nearly level soil requires only good tillage to keep it from washing or blowing.



Class II Irrigated or Class III Dryland. This is a moderately deep soil over gravel at 20 to 30 inches. This reduces the water-holding capacity. The topsoil is dark to a depth of 8 to 12 inches, indicating moderate organic content. When this soil is on nearly level or gentle slopes, it requires ordinary conservation practices plus good tillage to keep it from washing or blowing.



Class III Irrigated or Class IV Dryland. Shallow soil 10 to 20 inches deep over coarse gravel. The surface is sandy. It has low water-holding capacity and is subject to both wind and water erosion. On nearly level to gentle slopes it requires complex conservation practices. Class IV also requires use for hay and pasture crops at least half the time to prevent erosion.



Class VI Land. Shallow soil with low water-holding capacity. The depth is 6 to 12 inches over gravel. It must be kept in permanent, well-managed grass cover to prevent erosion.

DRY CROP LAND

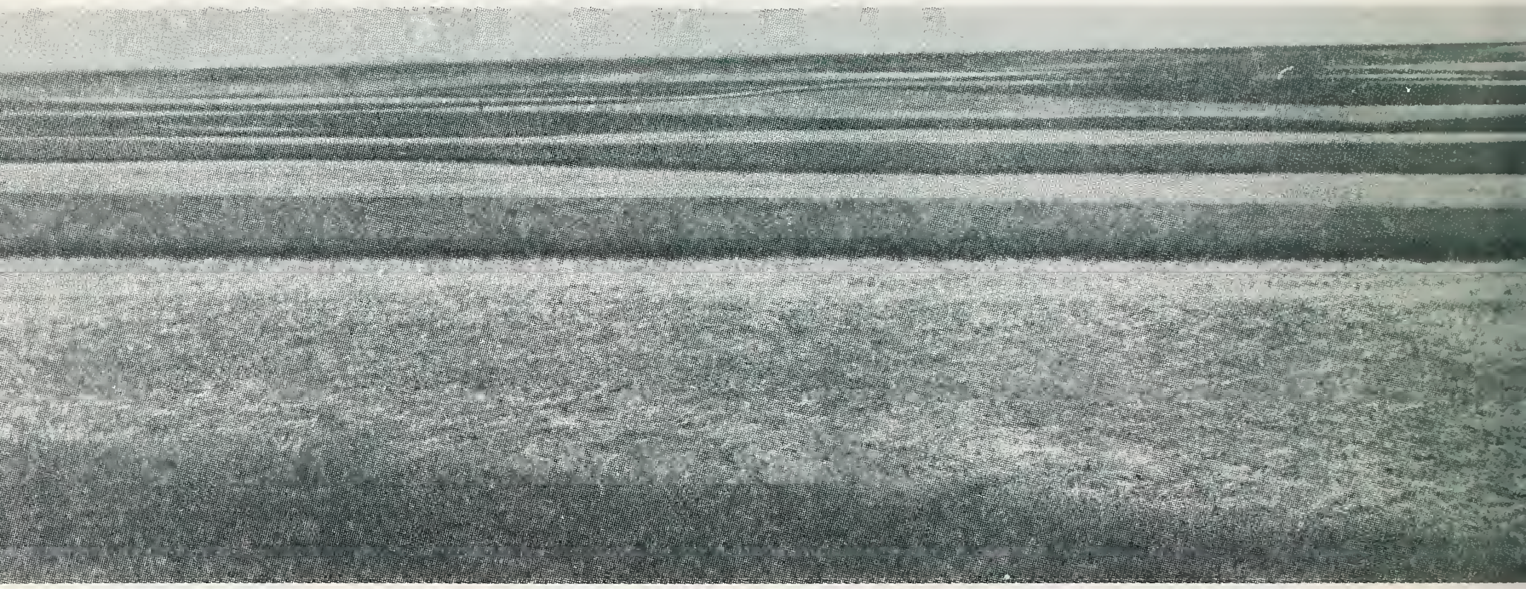
The main problems of non-irrigated or dry land farming in Montana are the storage of as much moisture in the soil as possible from one year to the next, and prevention of wind and water erosion.

Summer tillage, usually called summer fallow, was adopted to conserve moisture, but the cultivated soil was very susceptible to blowing from high winds common to the state east of the mountains. Strip cropping, with alternate strips of crop and fallow at right angles to the prevailing winds, combined with leaving crop residues on the surface by sub-surface cultivation, have proved to be the most effective remedies.

Wind and water erosion problems on sloping land have been met by farming on the contour in alternate strips of crop and fallow, called contour stripping, and grassed waterways installed in natural run-off channels to prevent the washing of deep gullies by heavy rains in the cultivated soils of fallowed fields.

The problem of wind erosion on an unstripped or block fallowed field is graphically shown at left. Typical damage from water erosion is shown at right.

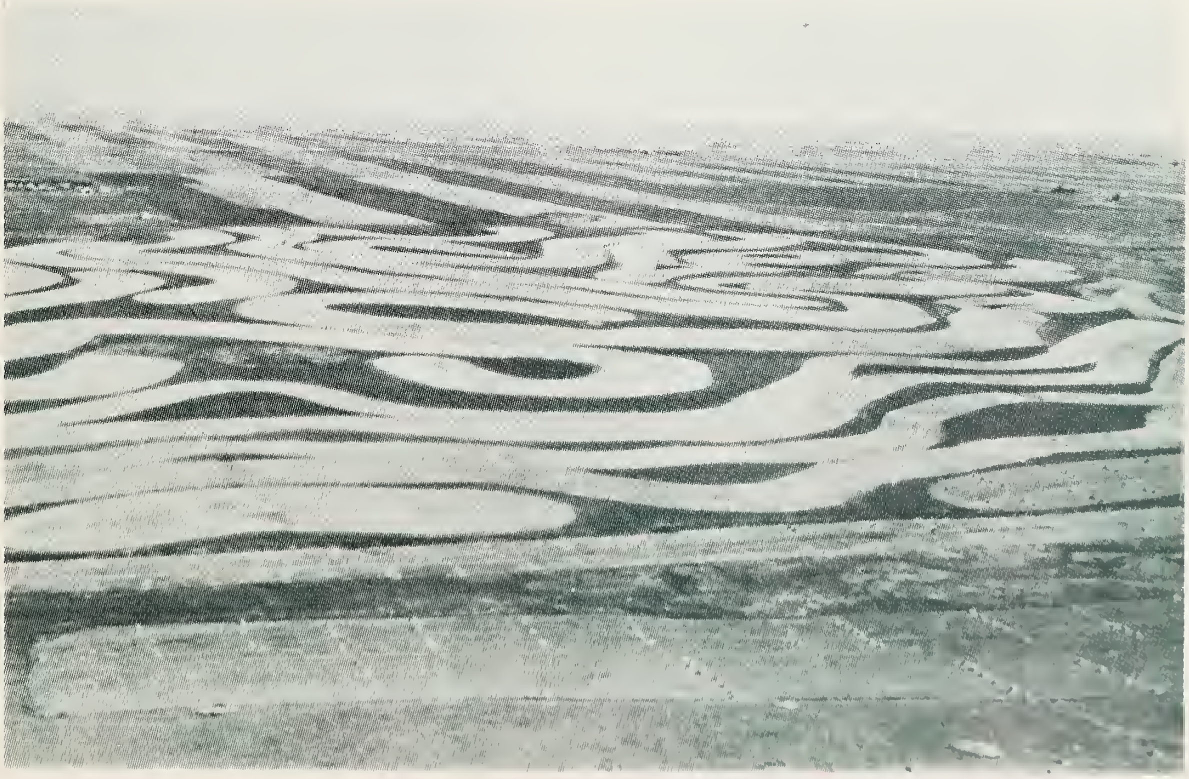
Wind strip cropping in the Cascade County District.



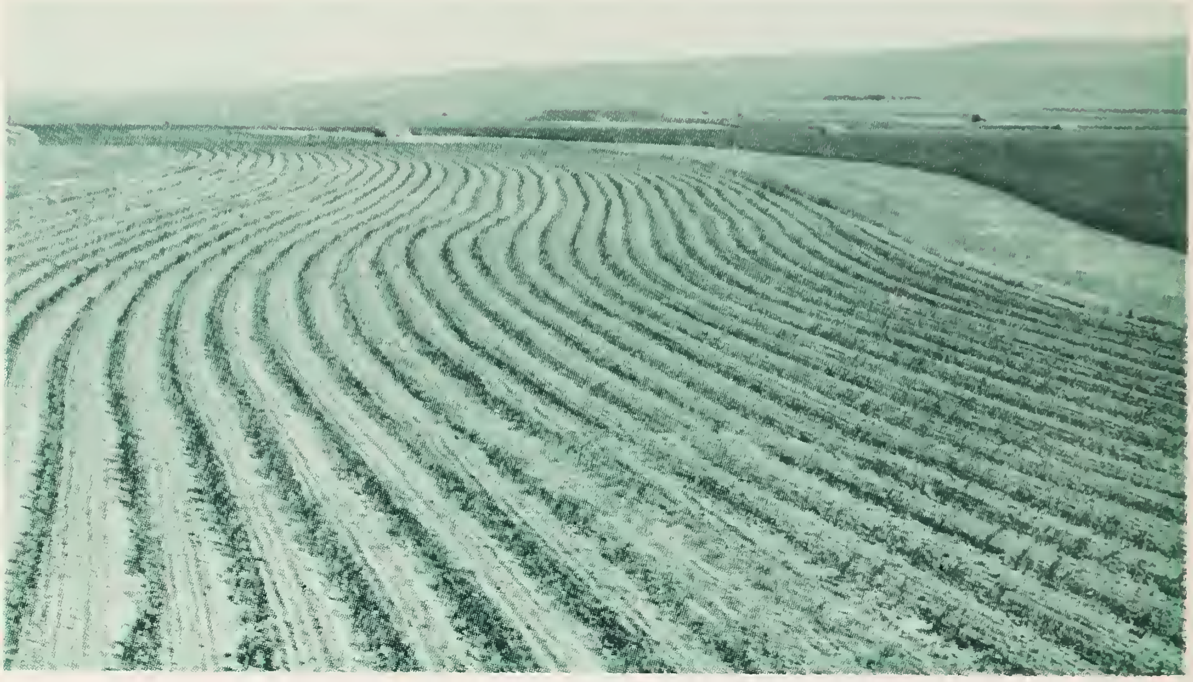
Wind strip cropping and stubble mulching by sub-surface tillage in the Liberty County District are the best combination for preventing wind erosion.

Excellent stubble mulching on the Carston Black farm in the Roosevelt County District has stopped soil blowing.

A. P. Anderson, supervisor of the Cascade District, inspects stubble mulch tillage which he combines with strip cropping.



Contour strips on the Lars Angvick farm in the Reserve District in Sheridan County provide protection from both wind and water erosion on sloping land.



Above: Contour farming with strips of grain, corn and buffers of crested wheatgrass in Little Beaver District in Fallon County.

Below: A sod waterway is being made by seeding smooth brome grass with spring wheat on the Calvin Cook farm in the Daniels County District. The small diversion dike in the far background will keep runoff out of the channel until grass is established.

There are about 4 million acres of straight strip cropping in Montana, nearly 4 million acres of stubble mulch tillage, and 86,000 acres of contour strip cropping. Much remains to be done since strip cropping and stubble mulch should be followed on an additional 3 million acres, while contour strips are needed as a safeguard from damage on 1 million more acres.

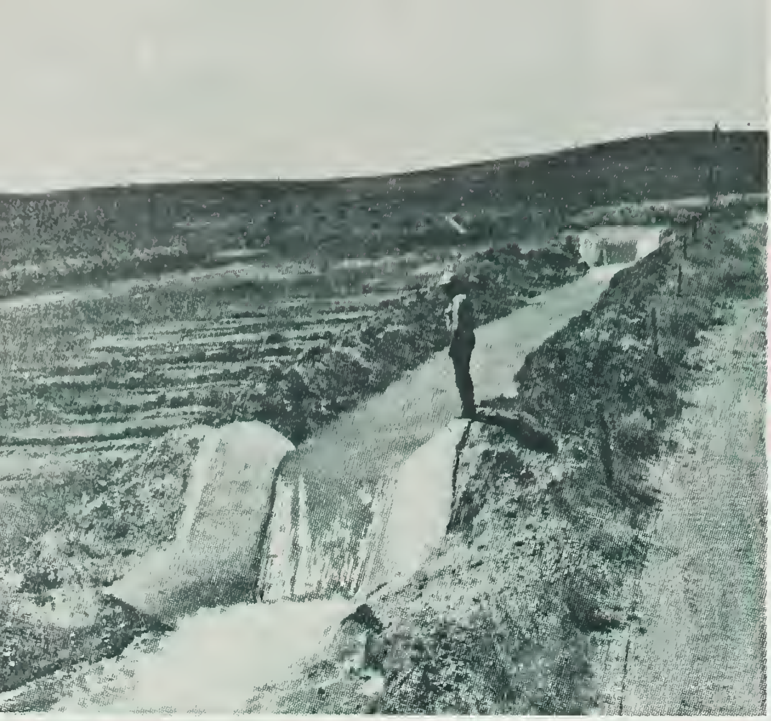
IRRIGATED CROP LAND

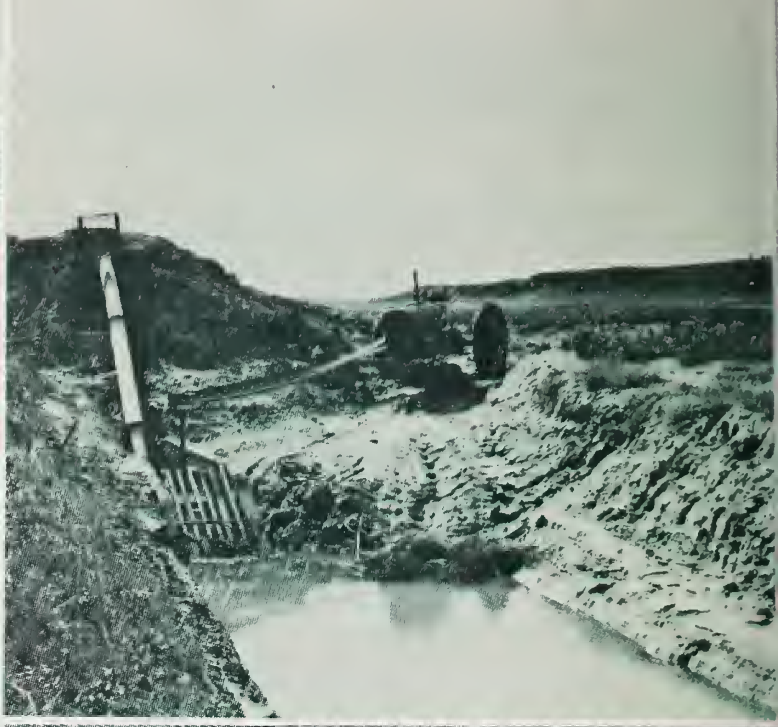
Montana has more than 1,700,000 acres of irrigated land which produces the bulk of the winter feed for the state's livestock, and supports the sugar beet industry, along with other specialty crops such as potatoes and beans. While the irrigated acreage is not large in proportion to the total farm land, it is essential to our prosperity.

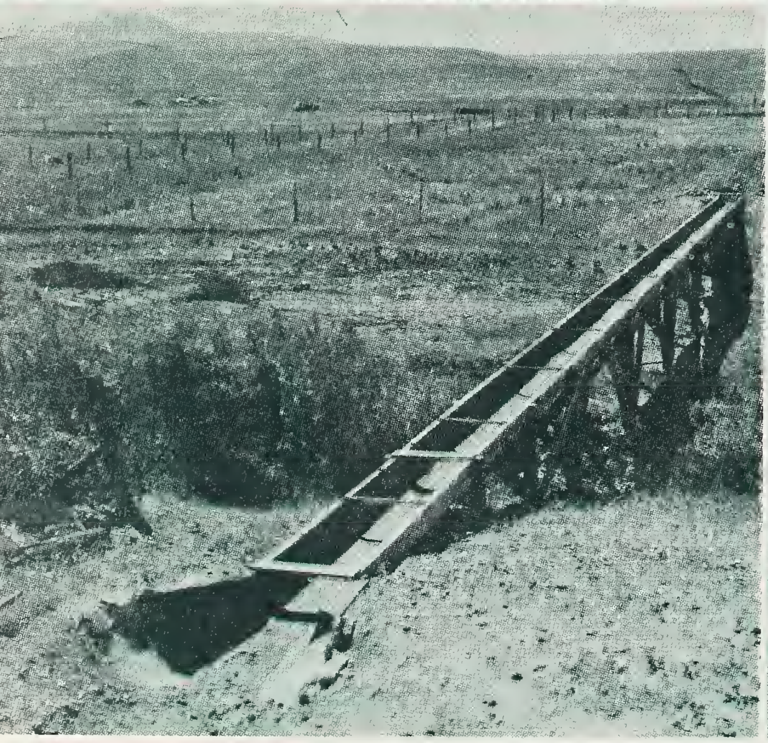
Improvement of irrigated land through the application of the best conservation practices has been an outstanding accomplishment of the Soil Conservation District program. Since the inception of the program in 1940, about 101,534 acres of land have been leveled, 241,121 acres have been drained, new irrigation systems have been installed on 128,502 acres, and existing irrigation systems have been revised on 377,317 acres.

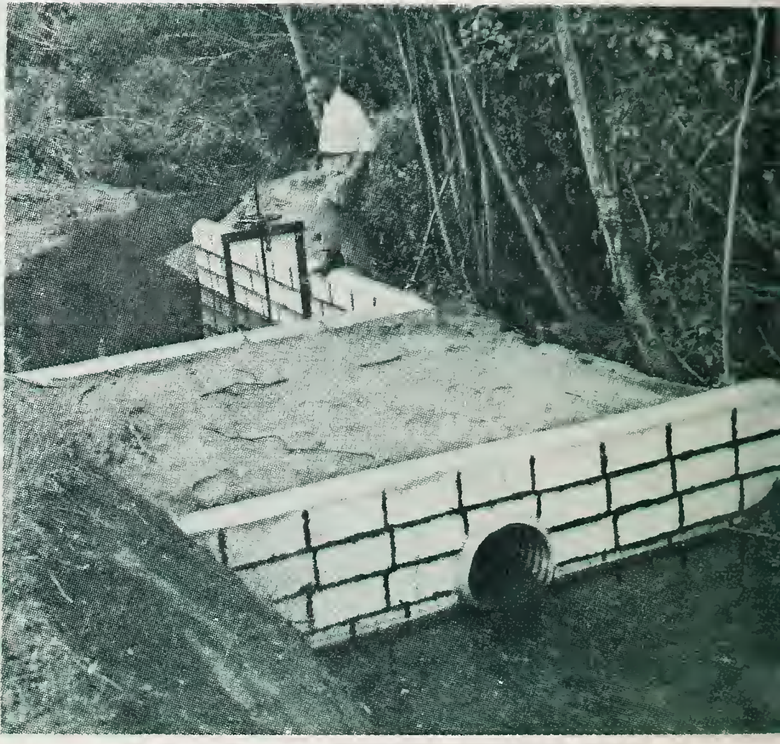
Individual land owners and groups of owners, with the help of Soil Conservation Service technicians assisting the districts, have done this work. Financing by payments for practices by the A.S.C., and loans from the F.H.A. have been major factors. Some of the accomplishments are shown in the following pictures.

This Fishlake group facility in the Pondera County District is an example of an accomplishment by five farmers who pooled their water rights and built this project to obtain adequate water storage for the irrigation of 1,500 acres of hay land and pasture.







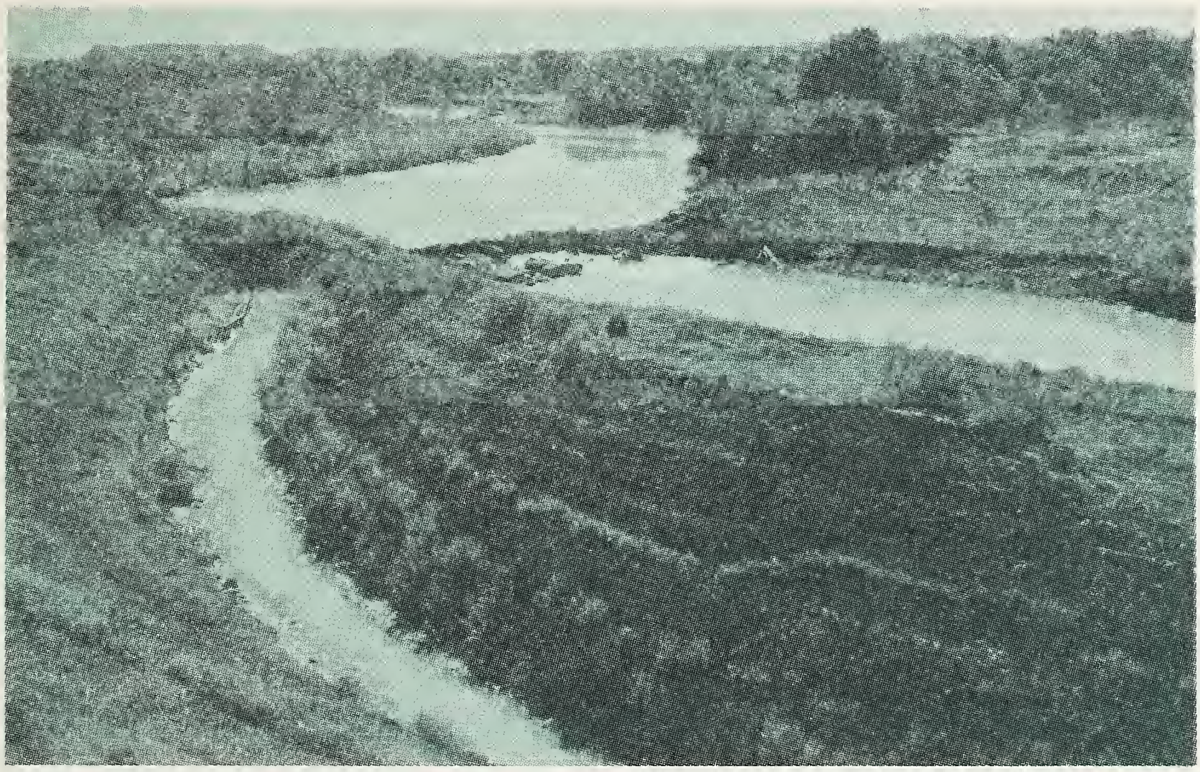


Upper Left: Two concrete drops are shown in an irrigation canal carrying 18 second-feet of water in the Petrolia District in Petroleum County.

Upper Right. This pump on the Stanley Gibb farm near Myers in the Treasure County District raises water from a ditch in the gravity irrigation system to an elevated ditch, and permits irrigation of land not possible to water otherwise.

Lower Left: This is a semi-circular flume across Surprise Creek on the Henry Evans ranch in the Judith Basin County District, which permits irrigation of the west side of a field.

Lower Right: A rock and brush dam diverts water from the stream to this concrete block headgate structure. It supplies water for 100 acres of land in the Mile High District in Silver Bow County.



A diversion irrigation dam and supply canal on the Tongue River in the North Custer District in Custer County.

Proper application of water and removal of excess water where necessary are essentials in successful irrigation.

This shows border dike irrigation in the Sun River District in Cascade County. Note the even distribution of water, and the low, easy-to-cross dikes.

Sprinkler irrigation in the McCone District in McCone County.

This steep land in the Flathead County District has been removed from cultivation and converted to improved sprinkler irrigated pasture by seeding brome grass, Alta fescue, orchard grass and Ladino clover.

Plastic siphons are being used in irrigating row crops in the Big Horn District.

Upper Left: This shows a contour ditch (center of picture) on sloping land in the Yellowstone District.

Upper Right: This drainage ditch in the Jefferson District benefits 120 acres on four farms, and the city of Whitehall. Note how the spoil banks have been leveled.

Lower Left: This canal check at the lower end of the main ditch on the Stone drainage project in the Granite District regulates the water table.

Lower Right: This group facilities drain in the Teton County District benefits 900 acres of farm land by providing for both surface and sub-surface drainage.

Flood irrigation is important to Montana livestock operators since it provides feed in many areas where water supplies are inadequate for dependable irrigation systems. Much has been done in Soil Conservation Districts in constructing flood irrigation systems which now serve 160,400 ocres.

Water flows through weirs of a flood irrigation system in the Boxelder District in Carter County.

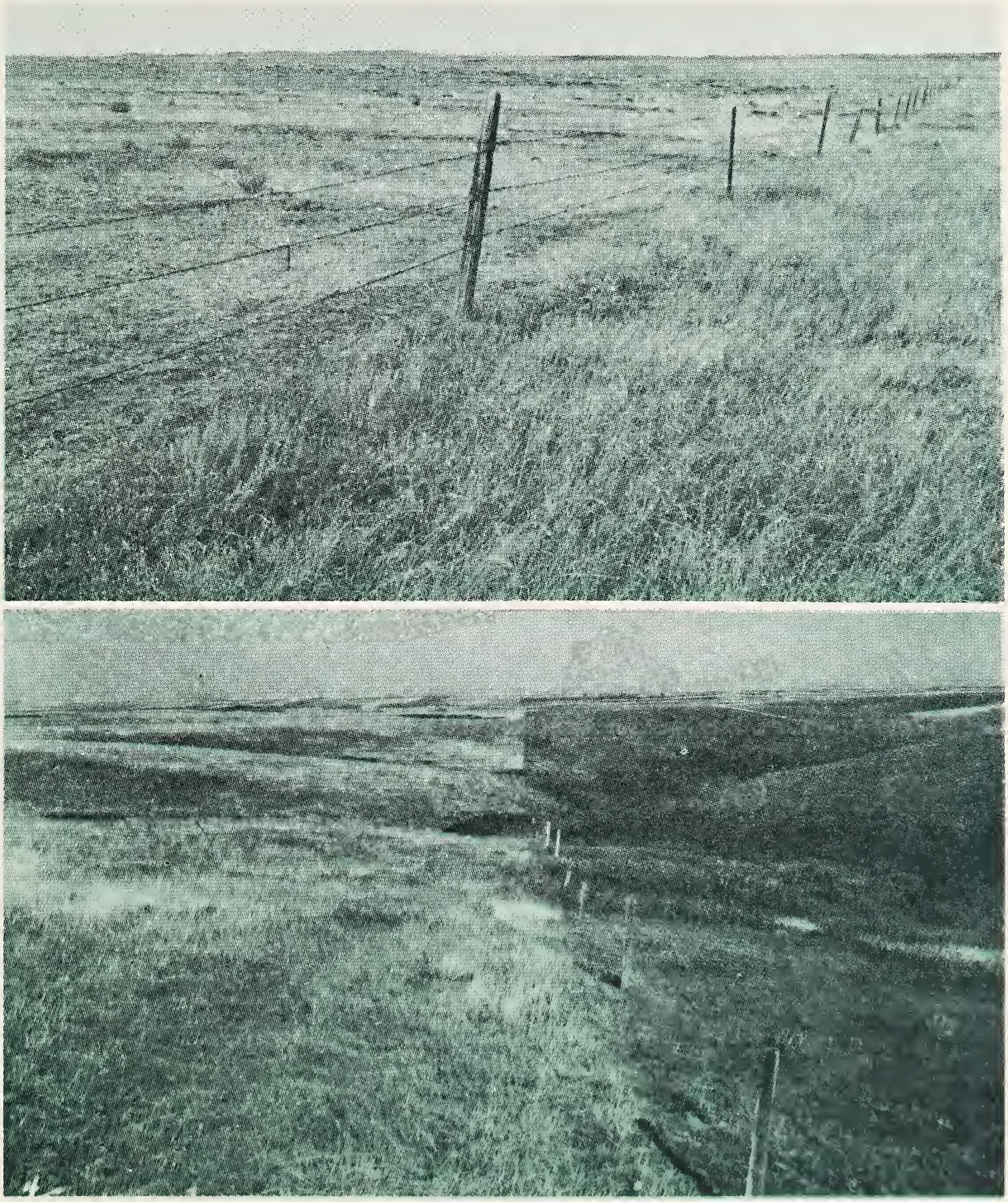
Stabilization of stream banks is another major problem in many parts of Montana. Much has been done to prevent their erosion by rip-rapping with rock.

This is an excellent example of rock riprapping in the Sweet Grass County District.

While much has been accomplished through installation of improved irrigation practices, the task ahead remains great. Estimates indicate there still are 490,805 acres needing to be leveled, 341,918 acres need new irrigation systems, while revision of existing systems is needed on 842,159 acres.

RANGE LAND

Livestock production is a major enterprise in Montana. Native grass is the "backbone" of the livestock business. Good native grass depends upon proper use and adequate water. Proper use is achieved by proper stocking and supplemental tame pastures.



These two fence-line contrasts reflect range conditions in the Beaverhead and Little Beaver Districts. In each picture notice the results of overgrazing on one side of the fence. Overuse has resulted in loss of good grasses and their replacement by weeds and brush. On the other side of the fence is range that has been grazed properly. Range so grazed as to stay in good or excellent condition produces more beef, mutton and wool. Less erosion of soil occurs. About 13 million acres of proper grazing has been established in soil conservation districts. Another 22 million acres of private lands are known to be in need of proper grazing.

Cattle are grazing range in excellent condition in the Shields Valley District. Note the solid stand of good grasses and lack of weeds, brush and cactus. This range is producing the maximum in pounds of beef per acre. Wind and water erosion are not a problem.

Tame pastures to take the "load" off native ranges in early spring provide more productive native range. Much native range needs a rest to allow the roots to grow deeper while the top develops mature seeds. This is called deferred grazing.

Crested wheatgrass "whipping" cheatgrass on a dry site in the Bitterroot District. Rows are 24 inches apart on the contour. This grass was seeded eight years ago in a solid stand of cheat. A lister drill with 8-inch shovels eliminated the cheat in the grass rows. Row seedings yield more than solid seedings when properly managed. Wind erosition is controlled by plant cover. Water erosion is checked by the contour furrows and grass residue. There now are 275,000 acres of pasture plantings in districts, and 771,855 more are to be seeded.

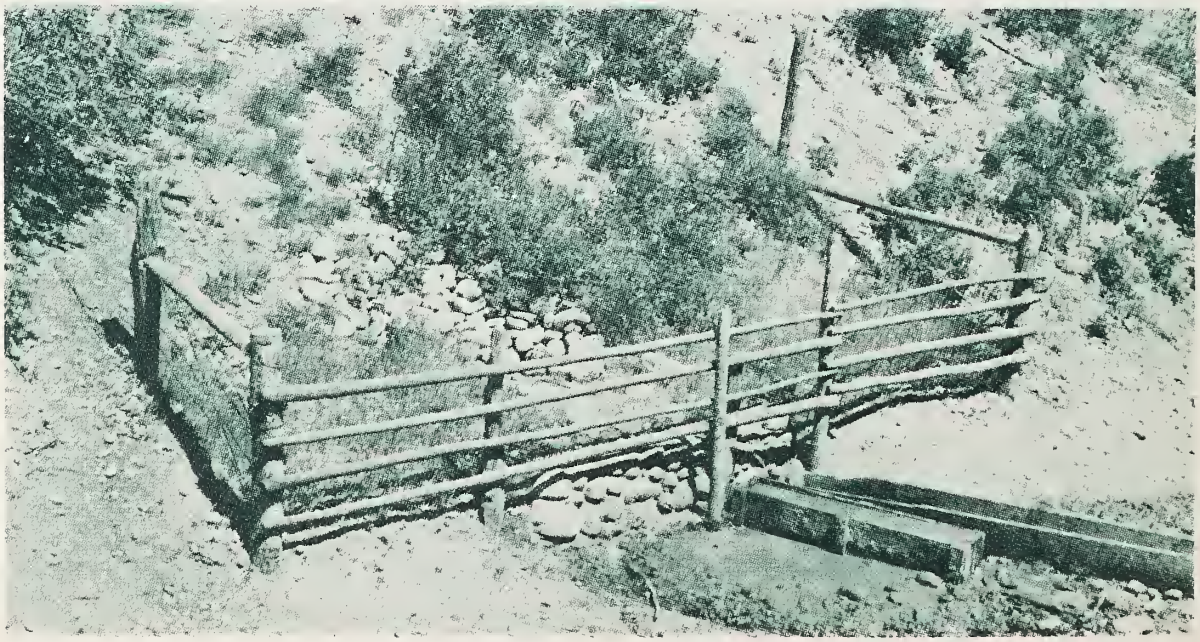
An excellent stand of solid seeding of crested wheatgrass in the Madison District. This pasture is used for early spring grazing to allow native grasses to get a good start. Such deferment of grazing on native grass permits improvement in range condition. Water and wind erosion are nil on this field. Nearly four million acres of range has been deferred in districts. Another four million acres are in need of deferment.

Cattle are grazing intermediate wheatgrass in the Broadwater District. This grass provides excellent spring and summer grazing when properly managed. This planting is in rotation with wheat. The grass will remain four to six years, and the field then will be in small grain and fallow for four to six years. Grass roots and residues help to prevent both wind and water erosion during the small grain fallow period. The grazing permits deferment of native grass.

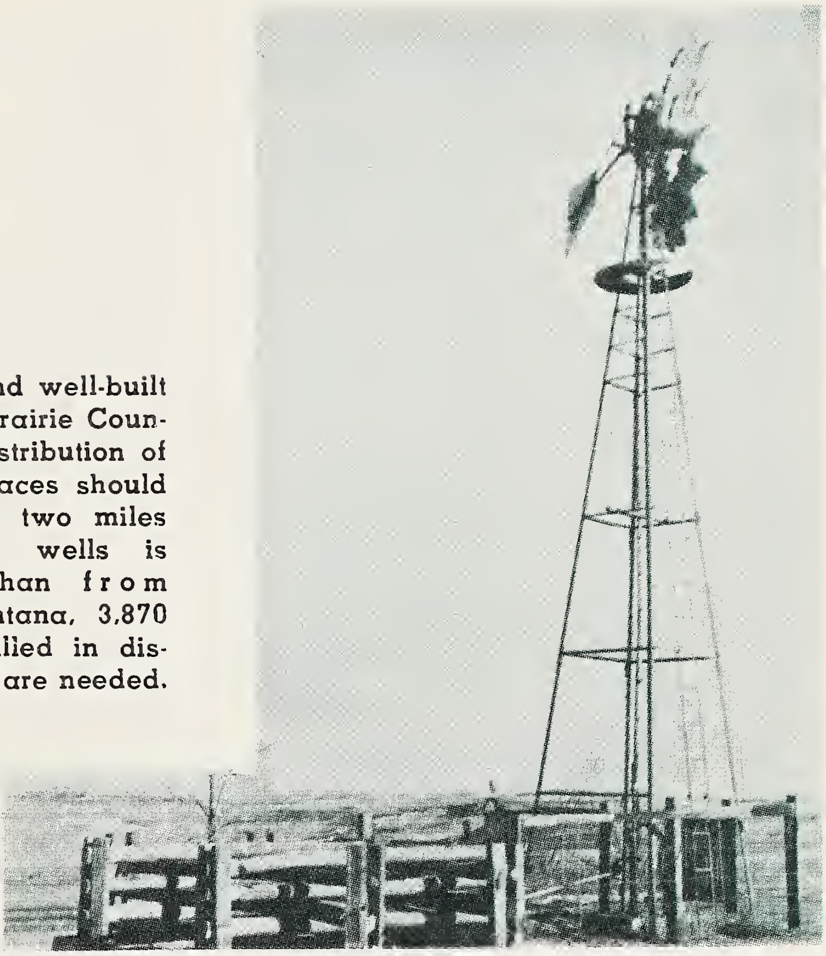
Correct location of stock water means to get enough water in the best possible locations to allow uniform grazing of a pasture or unfenced range. Well-watered range provides better gains of livestock, better use of total forage, less overuse around water, less water erosion, less silting of ponds, streams and springs, and more healthful water for livestock.

These pictures show common types of water developments.

This is a typical stock water dam in the Lower Musselshell District. The dam is rip-rapped to prevent wave action from destroying the fill. Not more than 50 animal units should water at a location if serious overuse of grass near the water is to be avoided. Nearly 17,000 stock water dams have been built in districts. Another 16,000 are needed.



Here is a good spring development in the Fergus County District. The spring area has been fenced to exclude livestock so trampling will not damage the water supply. Springs provide ideal water for livestock, and should be developed wherever practical. A total of 3511 springs have been developed in Montana districts, and 7413 more are needed.



This is a practical and well-built stock water well in Prairie County. To get proper distribution of livestock, watering places should not be more than two miles apart. Water from wells is more dependable than from small dams. In Montana, 3,870 wells have been drilled in districts, and 6,157 more are needed.

WOODLAND

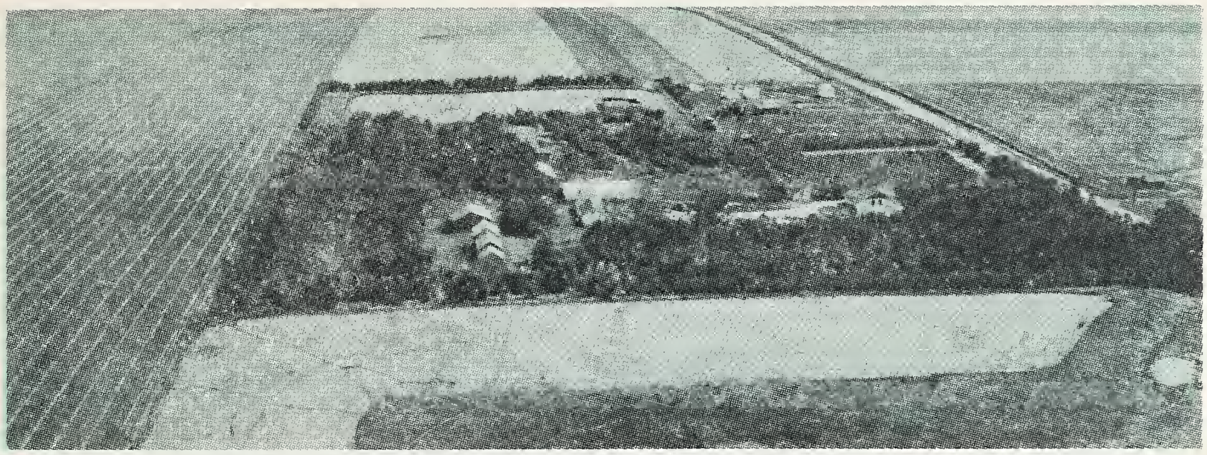
Montana's privately-owned timber land produces lumber, posts, poles, and Christmas trees. To get maximum production, woodlands must be managed in a conservation way. This means selective cutting of mature timber for lumber. Thick stands can be improved by thinning. Replanting is necessary where clear cutting has removed all trees. Stump culture and pruning are needed for Christmas tree production.

Here is a good stand of Ponderosa pine in the Missoula District. This stand has just been thinned and the cut trees sawed for firewood. The yield of lumber is increased by proper thinning. About 102,492 acres of privately-owned woodland in districts have been thinned, and 631,112 acres need thinning.

Douglas fir in the Lincoln District is being managed for Christmas tree production. The owner is about to harvest a tree produced from a stump that previously grew a tree. More than three million Christmas trees are shipped from Montana annually.

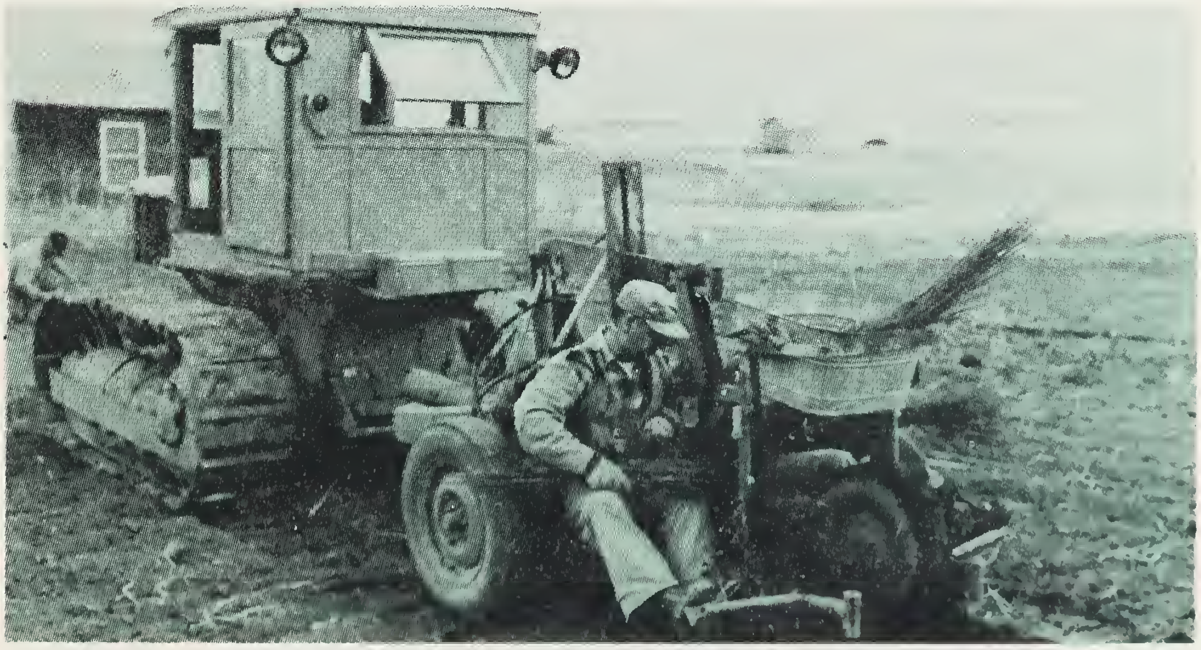
This Class II cropland in the Green Mountain District in Sanders County is being cleared for hay production. Cut trees will be used for pulp and firewood. This land is better suited for hay than for trees. Some land is better suited for trees and should not be cleared.

Farmstead windbreaks or shelterbelts provide protection to buildings, livestock and poultry. They also provide comfort and, in many cases, fruit for the farm family. Wind erosion in the farmyard is prevented. Windbreaks are highly desirable in a complete conservation program.



This is a well-planned windbreak in the Reserve District. Note the seven rows of trees on the two sides of the building site from which the prevailing wind comes. Beyond the seven-row windbreak is a two-row planting for protection to a feed lot. There are 4,265 acres of windbreak plantings in Montana districts, and another 4,000 acres are needed.

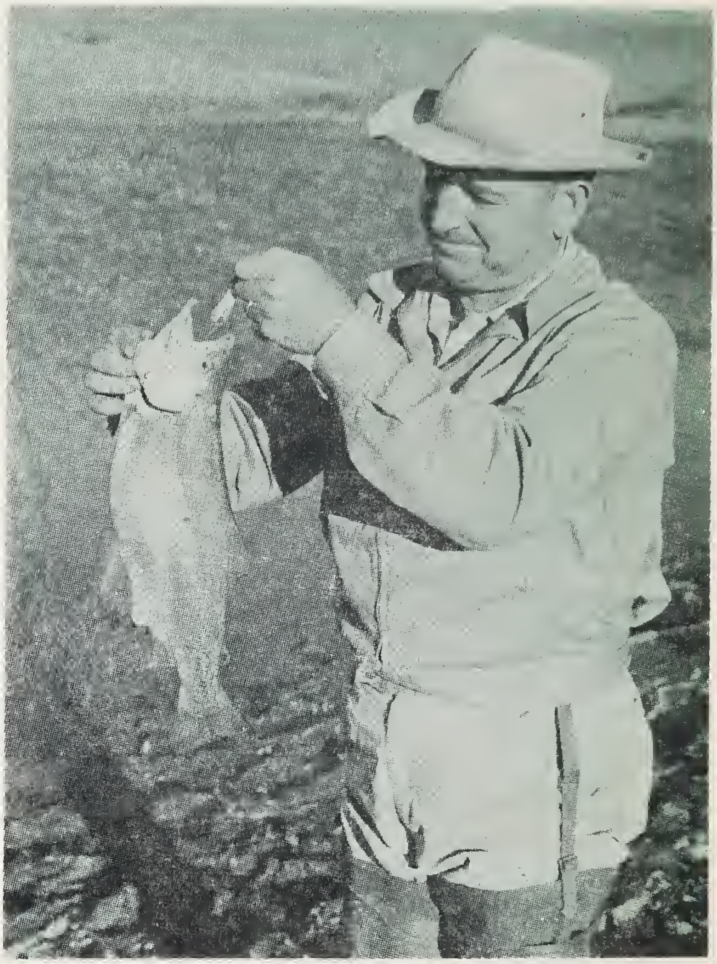
This three-year-old, seven-row windbreak is around two sides of a farmstead in Wibaux County. Note the clean tillage. This is important in Montana if stands are to be maintained and reach maximum height.



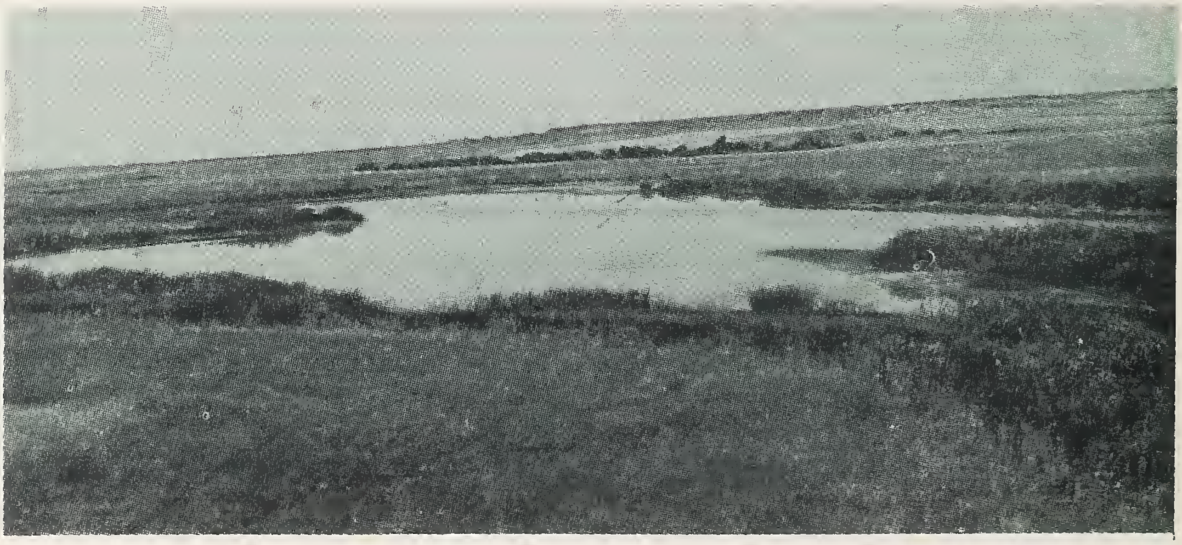
This district-owned tree planter is being used to plant a windbreak in the Toole County District. This is one type of equipment assistance that districts give to cooperators. A farmstead windbreak of 2,000 trees can be planted in 2½ to 3 hours.

FISH AND WILDLIFE

Fishing and hunting are treasured recreations in Montana. Some land is suited only for wildlife production. Other land may be used for wildlife and cash crops, hay, pasture, or woods. Still other land may be used for water storage for irrigation or livestock, and be stocked with fish. Wildlife management is a phase of soil conservation.

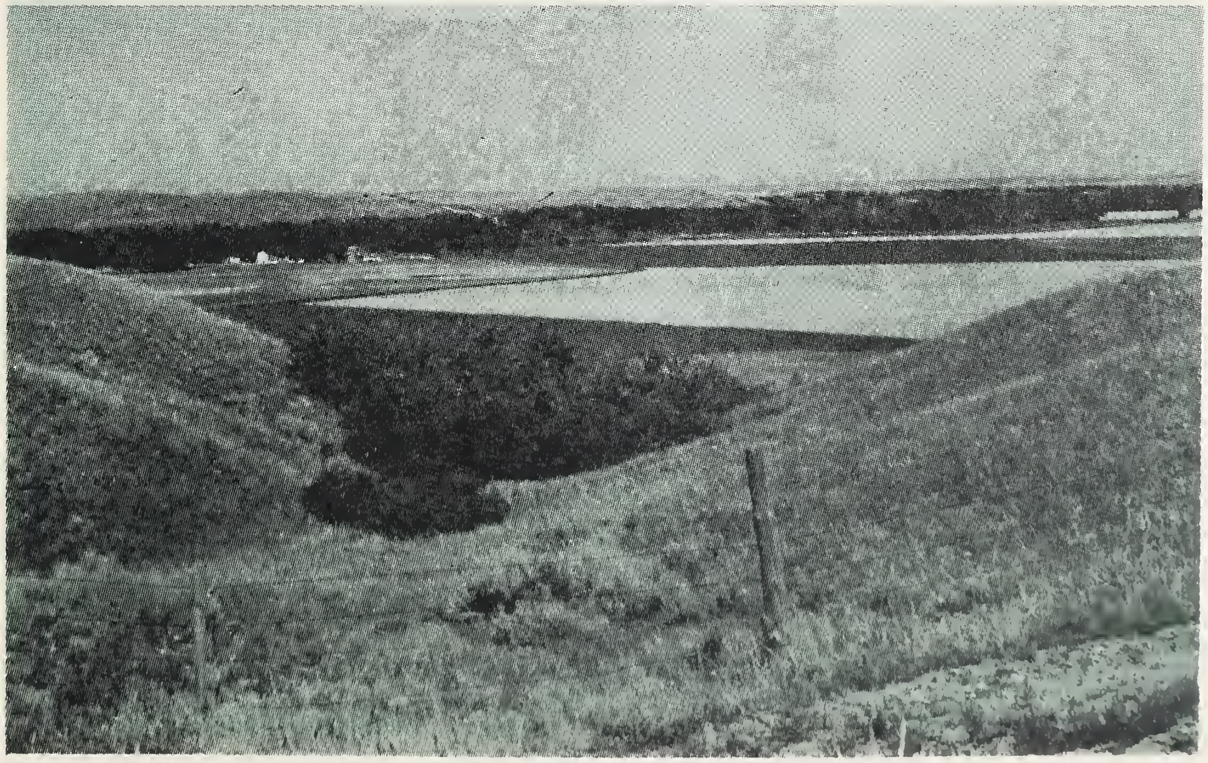


This three-pound, three-year-old rainbow trout was taken from a stockwater pond in the Toole County District. The trout is 19 inches long. Some ponds are not suitable for stocking of fish, but all suitable ponds should be stocked. In Montana, 611 reservoirs have been improved or stocked with fish and 3,239 remain to be done.



Here is a triple-purpose reservoir in the Dawson County District. This reservoir is used for flood irrigation, stockwater, and wildlife. Vegetation around the pond provides feed and cover for wildlife.

This area of land in the Wheatland County District is managed for the single purpose of wildlife. Marshes such as this provide habitat for waterfowl, muskrats, beaver and other wildlife.



Here is a wildlife planting in a draw in the Blaine County District. The shrub planting of buffaloberry and snowberry provides feed and cover for upland game birds while preventing gully erosion.

CONSERVATION EDUCATION

Almost everyone in Montana lives within a Soil Conservation District, but too few see the district as the people's method of bringing about better land use. Only a few understand the full purpose of and need for a better soil conservation program.

Children and youth of today will need to make much wiser use of the land in the future. If they are to do this, they need to be taught to appreciate the limitations and value of our land. They should be able to recognize good and poor land use rather accurately.

Many teachers and adult leaders of youth groups are doing all they can, but few have the training to present a full, sound conservation education program.

Nearly every district has an educational program planned with the local county agent, who often accepts leadership in the district educational activities. Local problems are given priority.

The State Association of Soil Conservation Districts has an educational program aimed at statewide problems.

District supervisors are informing the public of their better land use program through the press, radio, television, demonstrations, tours, and public meetings.

Farmers in the Hill County District attend a stubble mulch tillage demonstration.

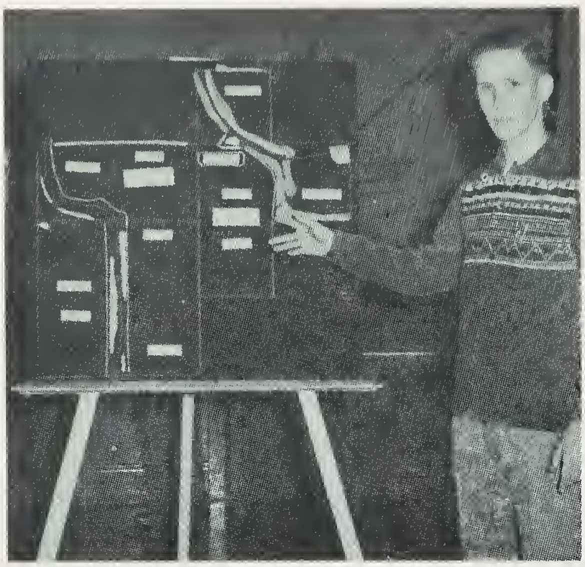
More than half of the districts have sponsored in-service teacher training workshops in Conservation Education. The districts furnish the instruction and school administrators make teacher attendance possible. Workshops usually last two days.

Rosebud County teachers receive instruction in range conservation during a county workshop.

A common method of awakening interest in our natural resources is to sponsor contests among school children. Many forms of contests are used.

Some of the winners in the Glacier County poster contest. Pupils are from the 6th, 7th, and 8th grades.

Most districts sponsor one or two 4-H Club delegates to the annual State 4-H Conservation Camp.

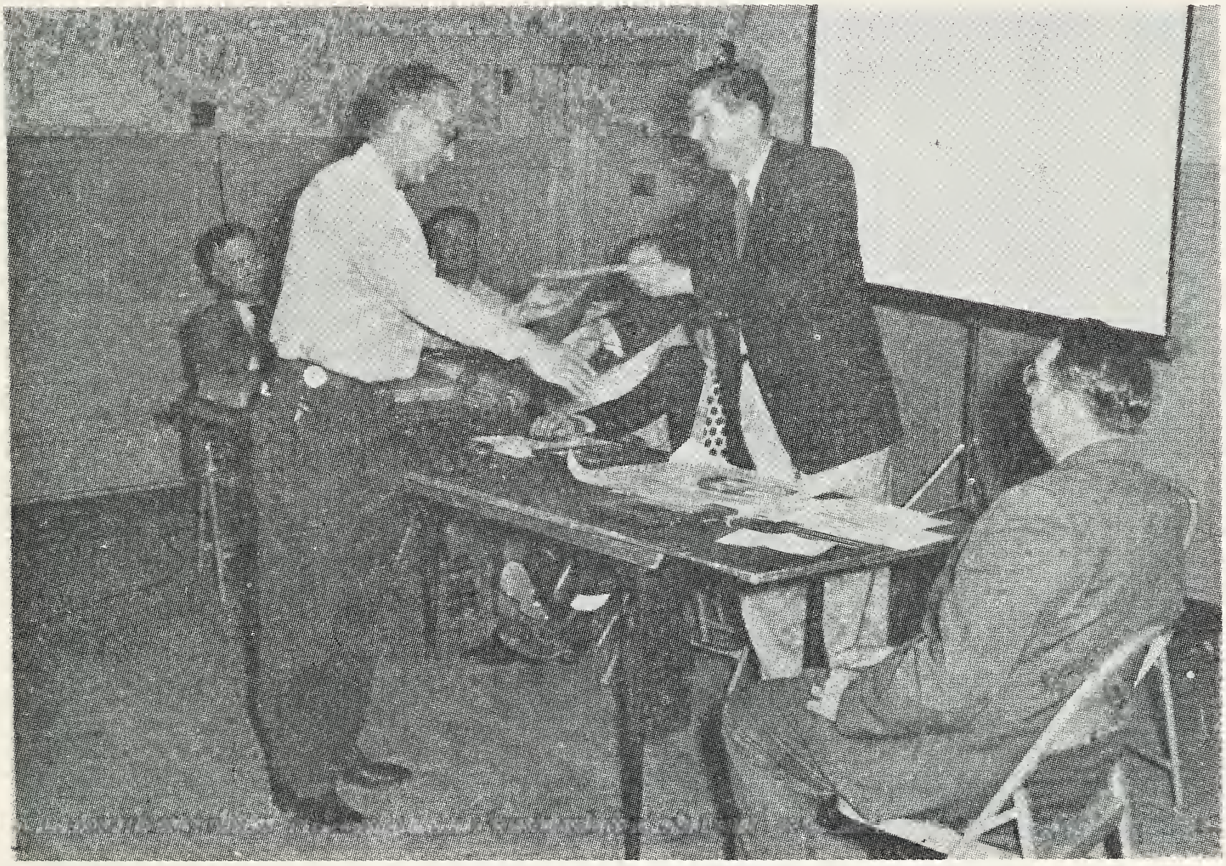


David Kimball uses a flannel-board in discussing wildlife at the annual meeting of the Treasure County District.

Considerable interest in land appreciation schools has developed in the last two years. More than half of the districts have held schools and land judging contests.

A group of F.F.A. boys receive instruction in land appreciation in the Pondera County District.

A few districts encourage businessmen to cooperate with the district by giving special recognition to those who do outstanding work.



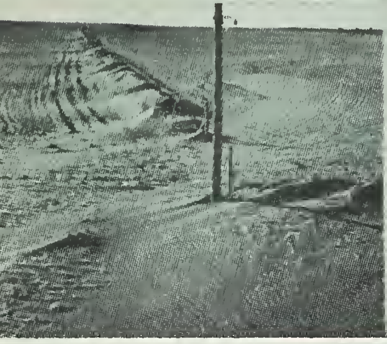
Jim Kirk of Glasgow receives a special award from the Valley County District.

Many districts hold Annual Conservation Day meetings to show practical application of better land use practices. Hundreds of farmers, ranchers and town people attend.

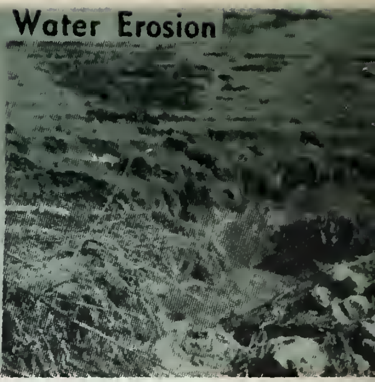
A group at Conservation Day in Big Horn District inspect a field leveled for improved irrigation.

McKEE PRINT.

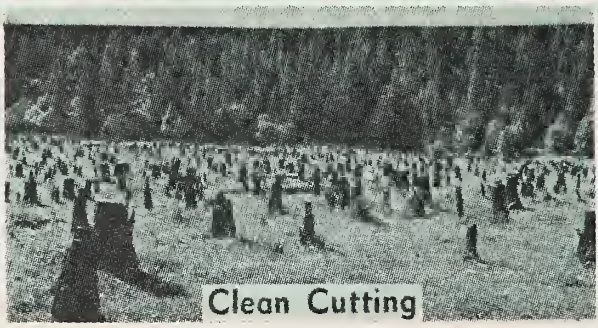
THE PROBLEM


Wind Erosion

Stream Bank Erosion

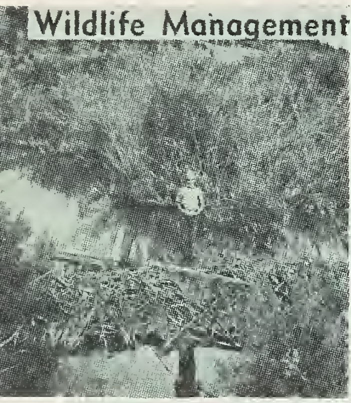

Water Erosion

Over Use


Clean Cutting

Seepage

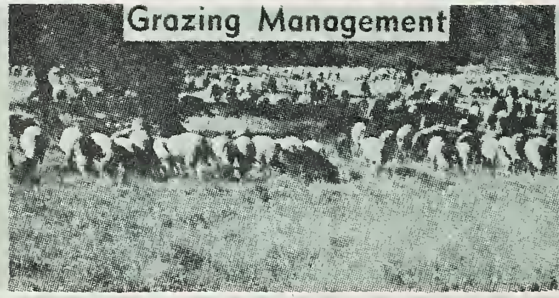
THE SOLUTION

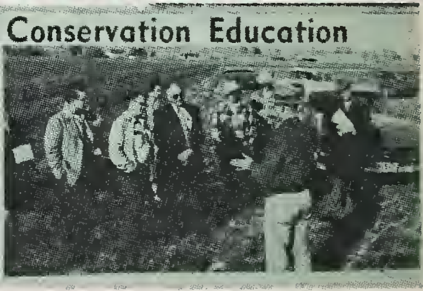

Wildlife Management

District Supervisors

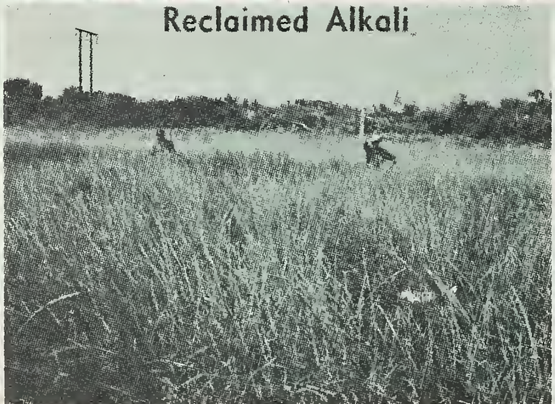
Contour Stripping

Flood Irrigation

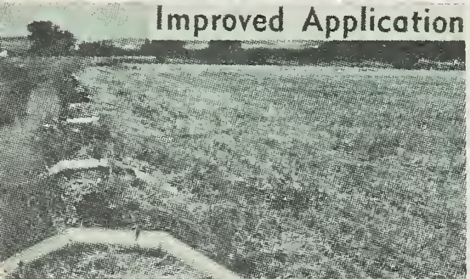

Grazing Management

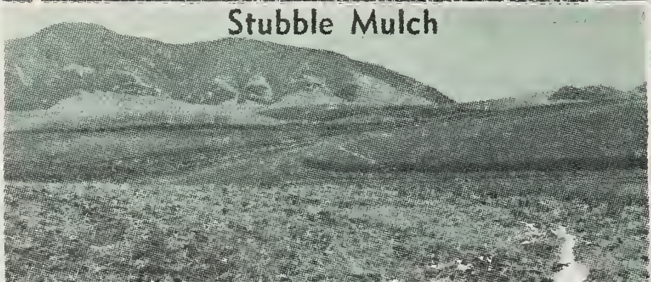

Conservation Education

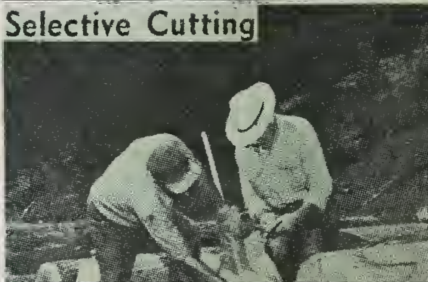
Watered Range


Reclaimed Alkali

Managed Pasture


Improved Application


Stubble Mulch


Selective Cutting